Development and characterization of Ni based anode for molten carbonate fuel cell

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Fuel cell is a device that directly converts chemical energy in the form of a fuel into electrical energy by way of an electrochemical reaction. In the anode for a high temperature fuel cell, nickel or nickel alloy has been used in consideration of the cost, oxidation catalystic ability of hydrogen which is used as fuel, electron conductivity, and high temperature stability in reducing atmosphere. There are some gains with decreased temperature in MCFC to diminish the electrolyte loss from evaporation and the material corrosion, which could improve the MCFC life. The two major contributors responsible for the voltage loss with reducing operation temperature are the ohmic polarization and electrode polarization. The oxidation reaction of hydrogen on an ordinary nickel alloy anode in MCFC is generally considered to take place in the three phase zone. In order to maintain a high performance of the fuel cell, it is necessary to keep this reaction responsible area as wide as possible with the porosity and specific surface area of the anode at a high level. In this study effective anodes are prepared for MCFC by using zirconium hydride or proton conducting materials at least in part of anode material.